

Status Report Rainbow Program 13 January 1958

1.1 We discovered that our range was limiting our measurement accuracy below 20 db by multiple reflections from objects both in and outside the room. Considerable time has been spent in reducing these multiple reflections with some success. Measurements have been made on shaded ellipses and other shapes at S-band (70 MC), C-band (130 MC), and X-band (210 MC). We shortly will be instrumental at K-band (600 MC). A new method of shading which involves sharks teeth and a uniform resistance sheet has been discovered. This should be much easier to apply in the fullscale work.

1.2 A memo has been written on various means of shading the plastic elements. It appears that considerable reduction in the plastic return at selected frequency bands can be realized by these means.

25X1A5a1 1.3 An X-band square material has been printed by [REDACTED]

25X1A5a1 [REDACTED] may have some preliminary measurements on it by 14 January.

1.4.3 In the light of the success with the pole facility (4.2), I feel that we probably should not use the craft system out West. We are now able to get correlation between flight tests and pole tests in a limited range about broadside. Craft would only increase this range slightly since it will only be some 6 db better. I feel the correlation we will get will be sufficient to convince us that we are getting meaningful data on the pole.

25X1A5a1 If there is not general agreement on this point, perhaps we should follow a suggestion by [REDACTED] and develop a larger

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-2-

reflector which can either be slowed by the 584 equipment or has its own drives. This approach could give us of the order of 20 db more dynamic range, sufficient to see the unprotected aircraft at all azimuths.

1.4.4 We still plan to provide an improved feed for the present system in the hopes that this will reduce our ground clutter returns.

1.5 Only the frequency jumping facility has not been shipped. This is now ready for shipment.

4.1 This system now has automatic range tracks as well as automatic azimuth and elevation tracks.

4.2 The pole system is complete and in operation except for the frequency jumping feature. Preliminary runs show a fantastic amount of detail all of which is reproducible to the minutest detail on successive runs. Broadside return is 65 db above MDS while the present shielded pole is about 20 db above MDS. This is below the minimum return from the unprotected article. The shield can be improved and [REDACTED] is designing a new one based on experience with the first.

4.3 [REDACTED] is preparing this system to go back on the air for additional tests in the near future.

4.4 I feel we should get rid of this system. It is of no further use to us. In an operation such as this in which we flagrantly violate established government procedures in order to get a job done rapidly, it behooves us to keep our inventory to

-3-

a minimum both in order to keep the operation small and flexible and minimize the number of years we may eventually have to spend in jail.

4.7 During the next weeks extensive tests on 359 will be conducted at different elevation angles, frequencies and polarizations. Also tests to determine the seriousness of reflections between the aircraft and the ground directly under the aircraft are to be made. At the end of this period 359 will be released and replaced by 378 which will be used for determining the limitations imposed on protection by unprotected scoop tailpipes, etc. A cross sectional measurement on a human being is being run to give some idea of how serious leaving the pilot exposed in Phase II will be.

4.8 These tests last summer were hampered by lack of time and some strange effects still not understood but thought to be atmospheric. Bissel has suggested that we continue those tests now that we have more time, better equipment and better atmospheric conditions. The main purpose here is not to evaluate the effectiveness of the wire treatment but rather the degree of correlation between model and field tests to give us some feel for the confidence we can have in our early proposals for Phase II which must of necessity be based on model tests only.

5.1 359 is now at the pole and will be until about 20 January. At that time it will be replaced by 378 which will be there for an indefinite stay. 367 will be used for the low frequency testing (4.8) at the end of which 367 will go to this pole for a quick survey.